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AC690+ Integrator Series

From 0.75 kW to 355 kW



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Milan, Italy



Littlehampton, UK



Filderstadt, Germany



Dijon, France

Integrator Series AC Drive - AC690+

Overview

Description

The AC690+ Series is a single range of AC drives designed to meet the requirements of all variable speed applications from simple single motor speed control through to the most sophisticated integrated multi-drive systems.
The heart of the AC690+ is a highly advanced 32-bit microprocessor based motor control model. This provides an exceptional dynamic performance platform to which can be added a host of communications and control options, enabling you to tailor the drives to meet your exact requirements.
The AC690+ is available in 380-500 V 3-phase 0.75 to 355 kW and 220-240 V 0.75 to 55 kW.



Features

Modes of Operation

The AC690+ can be user configured for 3 different modes of operation.
Open-loop (volts/frequency) control
This mode is ideal for basic motor speed control, or multiple motors driven in parallel. The quick set-up menu and plain language display ensures the quickest and easiest, trouble free start up.
Sensorless vector control
High starting torque and tight speed regulation is provided by a sophisticated MRAS (Model Reference Adaptive System) motor control strategy. MRAS provides accurate speed simulation (without the need for any speed measuring transducer) by continually modelling the motor.
Closed-loop vector control
Full closed-loop flux vector performance can be achieved with the AC690+ by simply adding an encoder feedback 'technology box'. This provides 100 % continuous full load standstill torque plus a highly dynamic speed loop (up to 45 Hz bandwidth); more than sufficient for the most demanding of applications.

Benefits

- Vector control with / without encoder feedback
- Power ratings 0.37 to 355 kW
- Pre-programmed application Macros
- Programmable over communications
- Programming identical to DC 590+ DC drive
- Variable torque ratings
- Class B EMC filters

Technical Characteristics - Overview

AC690+	Integrator Series AC Drive
Power supply	380...460 V (±10 %) 3-phase 0.75...355 kW 380...500 V (±10 %) 3-phase 2.2...110 kW 220...240 V (±10 %) 1-phase 0.37...2.2 kW 220...240 V (±10 %) 3-phase 0.37...37 kW
Environment	**Constant torque:** 0...45 °C (40 °C with IP40 cover) derating possible up to 50 °C max **Max altitude:** 1000 m, derate by 1% for every 100 m above 1000 m
Overload	**Constant torque:** 150 % for 60 s, 180 % for 1 s **Variable torque:** 115 % for 10 s
Output frequency	0...480 Hz
Dynamic braking	Each drive can be fitted with an internal dynamic brake switch Frame B to F: standard Frame G to J: optional

Demanding Environments

For environments that have dusty, humid or corrosive atmospheres, the AC690+ can optionally be supplied with conformally coated circuit boards that improve the drives resistance to corrosion, thereby increasing reliability and service life.
Industries that would typically benefit from conformal coating could include:

- Water and wastewater
- Paper and pulp processing
- Steel
- Marine and offshore
- Outdoor cranes
- Wind & wave power generation
- Food processing

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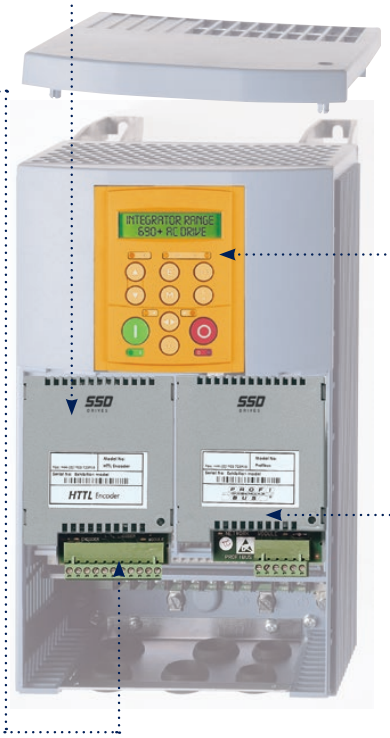
Encoder feedback option with encoder technology box

The AC 690+ is converted from open-loop control to high performance closed-loop control by simply adding the plug-in encoder feedback technology box.

High performance systems expansion module

The optional add-on “systems” expansion module is available for more advanced applications and includes phase locking between drives and register control. It fits behind the main control board and provides the following functionality:

- 5 configurable digital Inputs / outputs
- Converts existing 4 analogue inputs to high resolution (12 bit plus sign)
- 2 encoder inputs
- 2 high speed register mark inputs



Programming / Operator controls

The AC690+ HMI provides access to all of the drive’s functions in a logical and intuitive manner. The readout is backlit and displays all functions in plain language and engineering units. The HMI can be mounted on the drive itself, or alternatively it can be supplied loose, with a mounting kit, for mounting remotely on a panel door, for example.

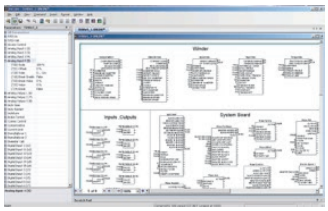
Open standard fieldbus communications

The AC690+ has a whole host of communication technology box options allowing seamless multi-vendor integration into networked systems using the most common industrial fieldbus communications protocols:

- Profibus-DP
- Ethernet
- DeviceNet
- Modbus RTU
- CANopen
- LinkNet

Integrated function blocks

- Winder Control
- Process PID
- Raise / Lower
- Spinning Load Start



Standards

The AC690+ series meets the following standards when installed in accordance with the relevant product manual.

CE Marked to EN50178 (Safety, Low Voltage Directive)
CE Marked to EN61800-3 (EMC Directive)
UL Listed to US safety standard UL508C.
cUL Listed to Canadian standard C22.2 #14.

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Technical Characteristics

General Characteristics

Power Supply	380...460 V (±10 %) 3-phase 0.75...355 kW; 380...500 V (±10 %) 3-phase 2.2...110 kW; 220...240 V (±10 %) 1-phase 0.37...2.2 kW; 220...240 V (±10 %) 3-phase 0.37...37 kW
Environment	Constant torque: 0...45 °C (40 °C with IP40 cover) derating possible up to 50 °C max Max altitude: 1000 m, derate by 1 % for every 100 m above 1000 m
Overload	Constant torque: 150 % for 60 s, 180 % for 1 s; Variable torque: 115 % for 10 s
Output Frequency	0...480 Hz
Switching Frequency	Frame B 3,6 or 9 kHz; Frame C, D, E and F 3 or 6 kHz - All with audibly silent switching frequency
Dynamic Braking	Each drive will be fitted with an internal dynamic brake switch as standard (frames B-F)
Analogue Inputs	4 Configurable, 10 bits (13 bits with optional system card). 0...10 V, 0...±10 V, 0...20 mA, 4...20 mA
Analogue Outputs	3 Configurable, 10 bits. 0...10 V, 0...±10 V, 0...20 mA, 4...20 mA
Digital Inputs	7 Configurable, nominal 24 VDC (30 VDC max)
Digital Outputs	3 Configurable, relay contacts 3 A/230 VAC
Reference Supplies	+10 VDC, -10 VDC, +24 VDC
Motor Thermistor input	PTC

Function Block Programming	Function block programming allows a tremendously flexible control structure to be created with ease. An almost infinite combination of user functions can be realised often alleviating the need for an external PLC. However, the drive is pre-configured so it can be used straight from the box as a standard AC drive without further adjustment.
Analogue Functions	If So, summing, subtractor, multiplier, divider, if higher then lower then If, Counter, Timer
Boolean Functions	NOT, AND, NAND, OR, NOR, XOR, Trigger, Flip-Flop
Application Macros	Simple speed control, Forward/Reverse, Raise/Lower, Process PID, Preset speeds, Winder control.
6901 Operator Keypad	The 6901 keypad is designed for setting-up, configuring and operating the AC690+ drive. The intuitive menu navigation and parameter display is simple and easy to use. Main features: • Remote mounting capability on front of enclosure • Backlit display • Multilingual 2x16 alphanumeric display • Customizable display • Local Control: Speed setpoint, Start/Stop, Jog and Direction • Password protection • Quick set-up mode
Systems Expansion Module	The optional systems expansion module allows for advanced applications such as phase locking between drives and register control. Key features include: • 5 Additional user configurable Inputs / Outputs • 4 High resolution analogue inputs (12 bits plus sign) • 2 Additional encoder inputs • 2 High speed register mark inputs

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Power Supply 380-460 V (±10 %) 50/60 Hz 3-phase

Order Reference	Frame	Constant Torque		Variable Torque		Inductance	Braking Module
		Nominal Power [kW]	Output Current [A]	Nominal Power [kW]	Output Current [A]		
690-431250B0-B...	B	0.75	2.5	-	-	N/A	Standard
690-431450B0-B...	B	1.5	4.5	-	-		
690-431550B0-B...	B	2.2	5.5	-	-		
690-431950B0-B...	B	4.0	9.5	-	-		
690-432140B0-B...	B	6.0	14			Standard - Internal Inductance DC Bus	
690-432160C0-B...	C	7.5	16	11	23		
690-432230C0-B...	C	11	23	15	31 (UL=27)*		
690-432300C0-B...	C	15	31	18.5	38		
690-432450D0-...	D	22	45	30	59 (UL=52)*		
690-432590D0-...	D	30	59	37	73		
690-432590E0-...	E	30	59	37	73	Standard - Inductance Internal 3-phase	
690-432730E0-...	E	37	73	45	87		
690-432870E0-...	E	45	87	55	105		
690-433105F2-...	F	55	105	75	145		
690-433145F2-...	F	75	145	90	165		
690-433180F2-...	F	90	180	110	205		
690-433250G2-...	G	132	250	150	302	External Inductance	Option
690-433361G2-...	G	180	361	220	420		
690-433420H2-...	H	220	420	250	480		
690-433480H2-...	H	220	420	250	480		
690-433520H2-...	H	280	520	315	590		
690-433590J2-...	J	315	590	355	650		

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Power Supply 380-500 V (±10 %) 50/60 Hz 3-phase

Order Reference	Frame	Constant Torque		Variable Torque	
		Nominal Power [kW]	Output Current [A)]	Nominal Power [kW]	Output Current [A]
690-532140C0-B...	C	7.5	14	11	21
690-532210C0-B...	C	11	21	15	27
690-532270C0-B...	C	15	27	18.5	34
690-532420D0-...	D	22	42	30	52
690-532520D0-...	D	30	52	37	65
690-532670E0-...	E	37	67	45	79
690-532790E0-...	E	45	79	55	98
690-533100F2-...	F	55	100	75	125
690-533125F2-...	F	75	125	90	156
690-533156F2-...	F	90	156	110	180

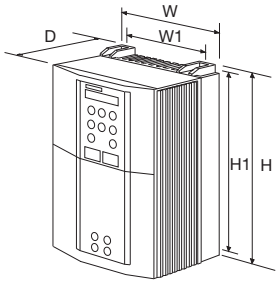
Power Supply 220-240 V (±10 %) 50/60 Hz

Order Reference	Number of phases	Frame	Constant Torque		Variable Torque		Inductance	Braking Module
			Nominal Power [kW]	Output Current [A]	Nominal Power [kW]	Output Current [A]		
690-211400B0-B...	1	B	0.75	4.0	-	-	No	Standard
690-212105B0-B...	1	B	2.2	10.5	-	-		
690-231400B0-B...	3	B	0.75	4.0	-	-		
690-232105B0-B...	3	B	2.2	10.5				
690-232165B0-B...	3	B	4.0	16.5				
690-232420D0-...	3	D	11	42	15	54	Standard - Internal inductance DC Bus	
690-232680D0-...	3	D	18.5	68	n.a.	n.a.		
690-232800E0-...	3	E	22	80	30	104		
690-233104F2-...	3	F	30	104	37	130	Standard - 3-phase Inductance	
690-233130F2-...	3	F	37	130	45	154		
690-233154F2-...	3	F	45	154	55	192		

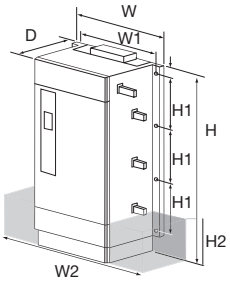
Power ratings stated based on a supply voltage of 230 VAC

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Dimensions



Frame B, C, D, E, F



Frame G, H, J

Model	Dimensions [mm]				Mounting Centres [mm]					Weight [kg]
	H without brake	H with brake	W	D	W2	H2	H1	W1	G	
Frame B	-	233	177	181	-	-	223	130	-	4.3
Frame C	-	348	201	208	-	-	335	150	-	9.3
Frame D	-	453	252	245	-	-	440	150	-	17.4
Frame E	-	669	257	312	-	-	630	150	-	32.5
Frame F	-	720	257	349	-	-	700	150	-	41.0
Frame G	1042	1490	455	465	675	225	300	420	16	100
Frame H	1177	1750	570	465	805	360	300	536	16	125
Frame J	1288	1825	1177	465	825	333	300	641	16	170

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Accessories and Options



Communication Cards

The AC690+ Communication cards allow the AC690+ to be connected to the most common industry standard fieldbuses

Features

- Communications cards are purchased separately for fitting on-site
- Dimensions HxWxD: 127 mm x 76.2 mm x 25.4 mm
- LED indication of network and card status

Ethernet Communications Interface	
*Order Code: 6053-ENET-00-G and 6055-ENET-00	
Supported Protocols	Modbus/TCP and Ethernet IP
Communication Speed	10/100 M bits/s
Station Address	Selectable via switch or Internet Explorer
Suitable for	AC690+ version 4.7+ DC590+ version 7.1+

RS485/Modbus Communications Interface	
*Order Code: 6053-EI00-00-G and 6055-EI00-00	
Supported Protocols	Modbus RTU, EI Bisynch ASCII
Cabling	RS485 2 or 4 wire
Communication Speed	300 to 115200 bits/s
Station Address	Selectable via Software
Suitable for	AC690+ version 4.7+ DC590+ version 5.17+

Devicenet Communications Interface	
*Order Code: 6053-DNET-00-G and 6055-DNET-00	
Supported Protocols	DeviceNet Drive Profile Drive – Group 2 slave only
Station Address	DeviceNet Drive Profile Drive – Group 2 slave only
Suitable for Drives	AC690+ DC590+ version 5.x+

Profibus-DP Communications Interface	
*Order Code: 6053-PROF-00-G and 6055-PROF-00	
Supported Protocols	Profibus-DP
Communication Speed	Automatically Detected
Station Address	Selectable via Software
Suitable for	AC690+ version 1.x+ DC590+ version 5.x+

CANopen Communications Interface	
*Order Code: 6053-CAN-00-G and 6055-CAN-00	
Profile	DS402
Supported Messages	SDO, PDO, NMT, SYNC
Communication Speed	20 K, 50 K, 125 K, 250 K, 500 K, 1M bits/s selectable
Station Address	Selectable via Switch
Suitable for	AC690+ DC590+ version 5.x+

LINKnet Communications Interface	
*Order Code: 6053-LNET-00 and 6055-LNET-00	
Supported Protocols	Modbus/TCP and Ethernet IP
Communication Speed	10/100 M bits/s
Station Address	Selectable
Suitable for	AC690+ DC590+ version 5.x+

* Refer to previous page for details of drive frame compatibility

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HTTL Encoder Feedback Card



Description

The HTTL Encoder Feedback Card allows an incremental encoder to be connected to the AC690+ AC drive, allowing users to take full advantage of the integrated torque control and speed regulation functionality.

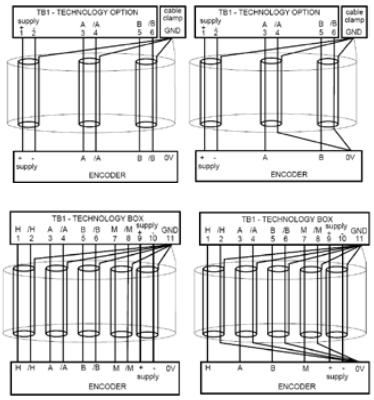
The HTTL Encoder Feedback card has the following features:

- 4 Optically isolated differential inputs A, B, M and H
- Adjustable isolated 10...20 V encoder power output

Specifications

Maximum input frequency	250 kHz
Receiver current consumption	≤10 mA per channel
Input format	2-channels in quadrature, clock / direction, or clock only
De-phasing	>1 µs
Differential input voltage	10...30 V max
Encoder power	Maximum Load: Card LA467461-1: 200 mA or 2 W Housing 6054-HTTL-00: 250 mA or 2.5 W Voltage 10...20 V software adjustable

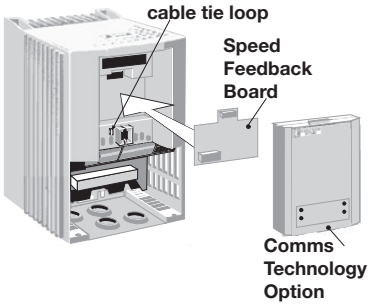
Installation and Cabling



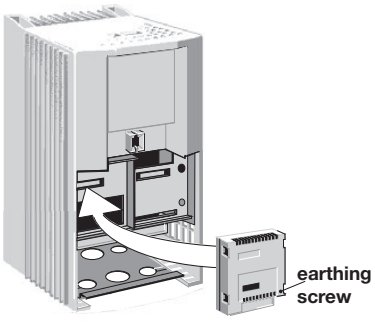
Product Codes

Order Code	Drives
LA467461-1	AC690+ Frame B (690-xxxxxxB...) drives
6054-HTTL-00	AC690+ Frames C - J drives

AC690+ Frame B AC Drives



AC690+ Frames C-J Drives



System Expansion Module

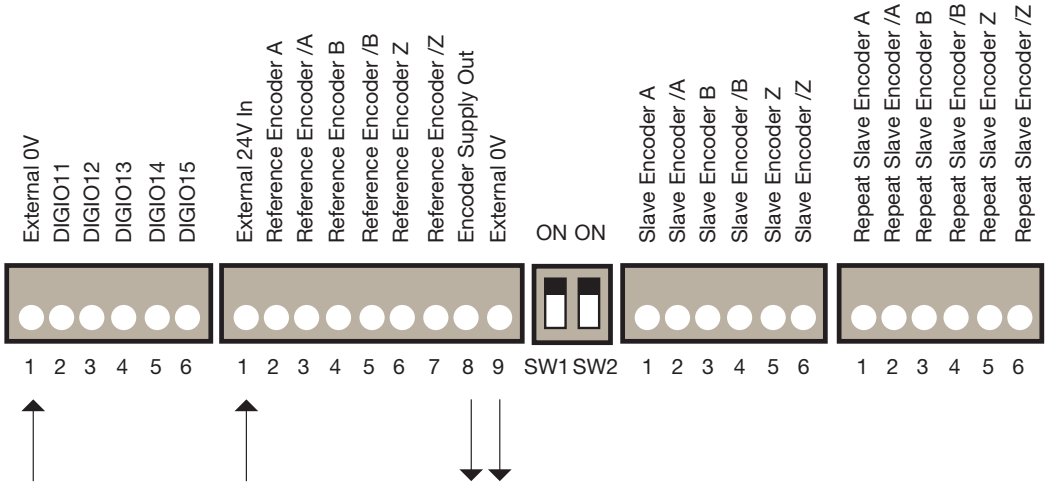
Description

With the System expansion module, the AC690+ can be used in sophisticated applications, or where a small amount of automation is required to be used in conjunction with the drive.
The following features are available:

- Analogue Inputs AIN1-4 become high resolution (12 bit plus sign)
- 5 isolated I/O points, configurable as either inputs or outputs
- Variable isolated output power for encoders
- Master encoder inputs (Isolated HTTL): A, A/, B, B/, Z and Z/
- Slave encoder inputs (Isolated HTTL): A, A/, B, B/, Z and Z/
- Slave encoder output retransmission (Isolated HTTL): A, A/, B, B/, Z and Z/.

External Power Supply

An external 1A / 24 VDC (±10 %) must be connected to the card.



Encoder Voltage Selection

SW1 \ SW2	OFF	ON
OFF	24 V	18 V
ON	12 V	5 V

Product Codes

Order Code	Drives
LA503493	System Board Kit Frames C-J

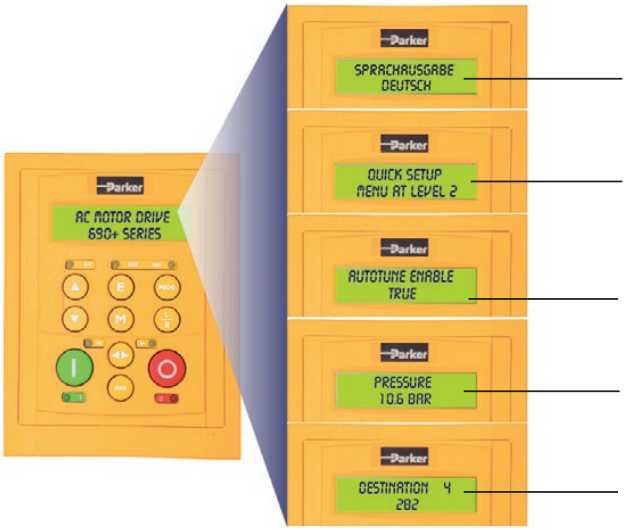
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Operator Keypads

Standard operator keypad 6901-00-G

Features

- Local motor control: start, speed, direction, diagnostics
- Operator menus and parameter configuration
- Quick setup menu
- Password protection for parameter configuration



Multilingual
English · French · German · Italian · Portuguese · Swedish · Polish

Quick setup menu
Intuitive menus allowing easy and quick setup of the drive

Auto-tuning
Automatic tuning of motor parameters ensures maximum dynamic motor performance

Diagnostics messages
Display input and output parameters as well as drive operating units

Drive configuration

Braking Resistors



for AC Drives

Description

Brake resistors are used with AC690 drives equipped with a braking option modules. They are designed to allow the drive to stop a motor at full load during deceleration or an overhauling load.

Brake resistor selection
Brake resistor assemblies must be rated to absorb both peak braking power during deceleration and the average power over the complete cycle.

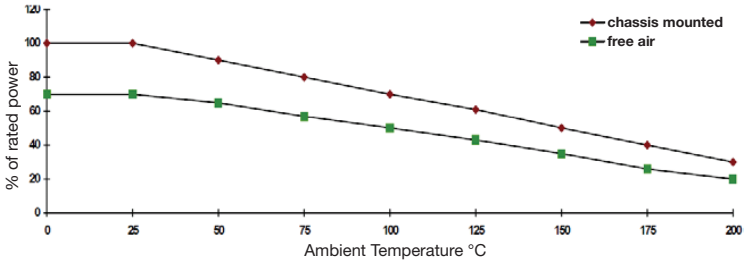
Resistors above 500 W
Resistors above 500 W are available upon request :

- IP20 protection up to 3 kW
- IP13 protection between 4.2 and 9.8 kW

$$\text{Peak braking power} = \frac{0.0055J \times (n_1^2 - n_2^2)\ (W)}{tb}$$

$$\text{Average braking power } P_{av} = \frac{P_{pk} \times t_b}{t_c}$$

J - total inertia in kgm²
n_1 - initial speed in min^{-1}
n_2 - final speed min^{-1}
t_b - braking time in s
t_c - cycle time in s

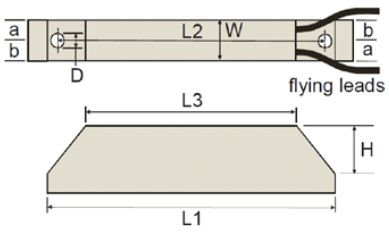


Dimensions

Nominal Power [kW]	Dimensions		
	L [mm]	H [mm]	P [mm]
1.0	137	450	140
1.6	182	450	140
2.0	182	450	140
2.5	227	450	140
3.0	227	450	140
4.2	450	440	540
5.6	530	440	540
7.0	530	440	540
8.4	610	440	540
9.8	610	440	540

Model	Impedance [Ω]	Nom. Power [W]	Dimensions							
			L1	L2	L3	W	H	D	a	b
CZ467715	500	60	100	87	60	22	41	4.3	10	12
CZ467714	200	100	165	152	125	22	41	4.3	10	12
CZ389853	100	100	165	152	125	22	41	4.3	10	12
CZ467717	100	200	165	146	125	30	60	4.3	13	17
CZ463068	56	200	165	146	125	30	60	4.3	13	17
CZ388397	56	200	165	146	125	30	60	4.3	13	17
CZ388396	36	500	335	316	295	30	60	4.3	13	17
CZ467716	28x2	500	335	316	295	30	60	4.3	13	17

Overload 5 s : 500 %
Overload 3 s : 833 %
Overload 1 s : 2500 %



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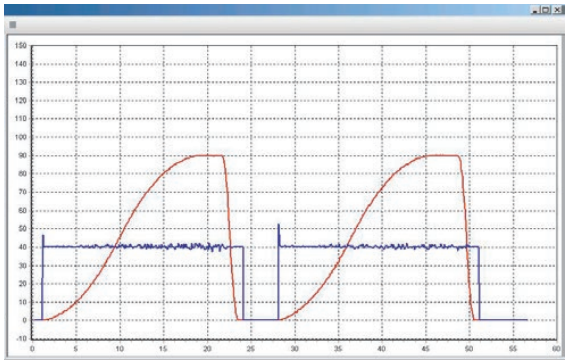
Software

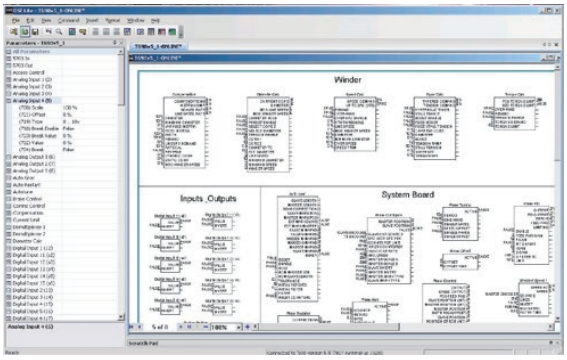
Drive System Explorer Lite (DSE Lite) Software

Description

DSE Lite software is an easy to use configuration, commissioning and monitoring tool with graphical interface for the Parker SSD Drives range of AC and DC drives.
While the drive is in running mode the oscilloscope function allows "on-line" monitoring of selected parameters and the recording of trends.

DSE Lite, allows the user to create, parameterize and configure user defined applications thanks to function blocks dedicated to speed control, Winder, PID, Diameter calculator, Shaftless...
DSE Lite is downloadable from our website.
www.parker.com





Order Code

AC690+ Integrator Series

	1		2	3	4		5	6	7	8	9		10	11	12	13
Order example	690	-	21	1400B	0	-	B	0	0	P	00	-	A	4	0	0

1 Product Family

690	AC690+ Integrator Series AC Drive

2 Supply Voltage

21	230 V 1-phase
23	230 V 3-phase
43	400/460 V 3-phase
53	400/500 V 3-phase

3 Power / Current Rating @230 V 1-phase

@230 V 1-phase	Constant Torque kW/A	Constant Torque HP/A	Variable Torque kW/A	Variable Torque HP/A	Frame
1400B	0.75/4.0	1.0/4.0	-	-	B
2105B	2.2/10.5	3.0/10.5	-	-	B

@230 V 3-phase	Constant Torque kW/A	Constant Torque HP/A	Variable Torque kW/A	Variable Torque HP/A	Frame
1400B	0.75/4.0	1.0/4.0	-	-	B
2105B	2.2/10.5	3.0/10.5	-	-	B
2165B	4.0/16.5	5.0/16.5	-	-	B
2420D	11/42	15/42	15/54	20/54	D
2680D	18.5/68	25/68	-	-	D
2800E	22/80	30/80	30/104	40/104	E
3104F	30/104	40/104	37/130	50/130	F
3130F	37/130	50/130	45/154	60/154	F
3154F	45/154	60/154	55/192	84/192	F

@400/460 V 3-phase	Constant Torque kW/A @400 VAC	Constant Torque HP/A @460 VAC	Variable Torque kW/A @400 VAC	Variable Torque HP/A @460 VAC	Frame
1250B	0.75/2.5	1.0/2.5	-	-	B
1450B	1.5/4.5	2.0/4.5	-	-	B
1550B	2.2/5.5	3.0/5.5	-	-	B
1950B	4.0/9.5	5.0/9.5	-	-	B
2140B	6.0/14	10/14	-	-	B
2160C	7.5/16	10/14	11/23	15/21	C
2230C	11/23	15/21	15/30	20/27	C
2300C	15/30	20/27	18.5/37	25/34	C
2450D	22/45	30/45	30/59	40/52	D
2590D	30/59	40/52	37/73	50/65	D
2730E	37/73	50/73	45/87	60/87	E
2870E	45/87	60/87	55/105	75/105	E

@400/460 V 3-phase	Constant Torque kW/A @400 VAC	Constant Torque HP/A @460 VAC	Variable Torque kW/A @400 VAC	Variable Torque HP/A @460 VAC	Frame
3105F	55/105	75/100	75/145	100/125	F
3145F	75/145	100/130	90/165	125/156	F
3156F	90/180	125/156	110/205	150/180	F
3250G	132/250	200/250	150/302	250/302	G
3316G	160/316	250/316	180/361	300/361	G
3361G	180/361	300/361	220/420	350/420	G
3420H	220/420	350/420	250/480	400/480	H
3480H	250/480	400/480	300/545	450/545	H
3520H	280/520	450/520	315/590	505/590	H
3590J	315/590	500/590	355/650	550/650	J

@ 500 V 3-phase	Constant Torque kW/A @500 VAC		Variable Torque kW/A @500 VAC		Frame
2140C	7.5/14	-	11/21	-	C
2210C	11/21	-	15/27	-	C
2270C	15/27	-	18.5/34	-	C
2420D	22/42	-	30/52	-	D
2520D	30/52	-	37/65	-	D
2730E	37/67	-	45/79	-	E
2870E	45/79	-	55/98	-	E
3105F	55/100	-	75/125	-	F
3145F	75/125	-	90/156	-	F
3156F	90/156	-	110/180	-	F

4 Auxiliary Supply

0	Not Required (frames B - E)
1	115V 1-ph (frame F - J only)
2	230V 1-ph (frame F - J only)

5 Brake Switch

B	Brake switch fitted (frames B-F) - Optional on frames G-J
0	Option (frames G-J)

6 Filter

0	Not fitted (option for frame B) (fitted filter not available for frames C – F)
F	Filter fitted (option on frame B only)

7 System Board

0	Not fitted (order as separate item)
S	System Board fitted (option on frame B only)

8 Mounting

P	Panel mount

9 Special Options

00	None
	Documented special options (01 - 99) (refer to local sales office)

10 Language

A	English (50 / 60 Hz)

11 Keypad

4	6901 keypad fitted

12 Speed Feedback

0	None

13 Communication

0	None

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Accessories and Options

Options	Frame	Fitting	Order Reference
Operator Keypad			
6901 Keypad	B - J	Option	6901-00-G
Remote mounting kit	B - J	Option	6052-00-G
Communication Cards			
Ethernet Modbus/TCP and Ethernet IP	B	Option	6053-ENET-00-G
	C - J	Option	6055-ENET-00
DeviceNet	B	Option	6053-DNET-00-G
	C - J	Option	6055-DNET-00
RS485 / Modbus	B	Option	6053-EI00-00-G
	C - J	Option	6055-EI00-00
Profibus-DP	B	Option	6053-PROF-00-G
	C - J	Option	6055-PROF-00
CANopen DS402	B	Option	6053-CAN-00-G
	C - J	Option	6055-CAN-00
Linknet	B	Option	6053-LNET-00
	C - J	Option	6055-LNET-00
Speed Feedback / Systems Module			
HTTL Encoder Card	B	Option	LA467461-1
	C - J	Option	6054-HTTL-00
Systems Expansion Module	C - J	Option	LA503493

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Parker's Motion & Control Technologies

At Parker, we're guided by a relentless drive to help our customers become more productive and achieve higher levels of profitability by engineering the best systems for their requirements. It means looking at customer applications from many angles to find new ways to create value. Whatever the motion and control technology need, Parker has the experience, breadth of product and global reach to consistently deliver. No company knows more about motion and control technology than Parker. For further info call 00800 27 27 5374



Aerospace

Key Markets

Aftermarket services
Commercial transports
Engines
General & business aviation
Helicopters
Launch vehicles
Military aircraft
Missiles
Power generation
Regional transports
Unmanned aerial vehicles

Key Products

Control systems & actuation products
Engine systems & components
Fluid conveyance systems & components
Fluid metering, delivery & atomization devices
Fuel systems & components
Fuel tank inerting systems
Hydraulic systems & components
Thermal management
Wheels & brakes



Climate Control

Key Markets

Agriculture
Air conditioning
Construction Machinery
Food & beverage
Industrial machinery
Life sciences
Oil & gas
Precision cooling
Process
Refrigeration
Transportation

Key Products

Accumulators
Advanced actuators
CO_2 controls
Electronic controllers
Filter driers
Hand shut-off valves
Heat exchangers
Hose & fittings
Pressure regulating valves
Refrigerant distributors
Safety relief valves
Smart pumps
Solenoid valves
Thermostatic expansion valves



Electromechanical

Key Markets

Aerospace
Factory automation
Life science & medical
Machine tools
Packaging machinery
Paper machinery
Plastics machinery & converting
Primary metals
Semiconductor & electronics
Textile
Wire & cable

Key Products

AC/DC drives & systems
Electric actuators, gantry robots & slides
Electrohydrostatic actuation systems
Electromechanical actuation systems
Human machine interface
Linear motors
Stepper motors, servo motors, drives & controls
Structural extrusions



Filtration

Key Markets

Aerospace
Food & beverage
Industrial plant & equipment
Life sciences
Marine
Mobile equipment
Oil & gas
Power generation & renewable energy
Process
Transportation
Water Purification

Key Products

Analytical gas generators
Compressed air filters & dryers
Engine air, coolant, fuel & oil filtration systems
Fluid condition monitoring systems
Hydraulic & lubrication filters
Hydrogen, nitrogen & zero air generators
Instrumentation filters
Membrane & fiber filters
Microfiltration
Sterile air filtration
Water desalination & purification filters & systems



Fluid & Gas Handling

Key Markets

Aerial lift
Agriculture
Bulk chemical handling
Construction machinery
Food & beverage
Fuel & gas delivery
Industrial machinery
Life sciences
Marine
Mining
Mobile
Oil & gas
Renewable energy
Transportation

Key Products

Check valves
Connectors for low pressure fluid conveyance
Deep sea umbilicals
Diagnostic equipment
Hose couplings
Industrial hose
Mooring systems & power cables
PTFE hose & tubing
Quick couplings
Rubber & thermoplastic hose
Tube fittings & adapters
Tubing & plastic fittings



Hydraulics

Key Markets

Aerial lift
Agriculture
Alternative energy
Construction machinery
Forestry
Industrial machinery
Machine tools
Marine
Material handling
Mining
Oil & gas
Power generation
Refuse vehicles
Renewable energy
Truck hydraulics
Turf equipment

Key Products

Accumulators
Cartridge valves
Electrohydraulic actuators
Human machine interfaces
Hybrid drives
Hydraulic cylinders
Hydraulic motors & pumps
Hydraulic systems
Hydraulic valves & controls
Hydrostatic steering
Integrated hydraulic circuits
Power take-offs
Power units
Rotary actuators
Sensors



Pneumatics

Key Markets

Aerospace
Conveyor & material handling
Factory automation
Life science & medical
Machine tools
Packaging machinery
Transportation & automotive

Key Products

Air preparation
Brass fittings & valves
Manifolds
Pneumatic accessories
Pneumatic actuators & grippers
Pneumatic valves & controls
Quick disconnects
Rotary actuators
Rubber & thermoplastic hose & couplings
Structural extrusions
Thermoplastic tubing & fittings
Vacuum generators, cups & sensors



Process Control

Key Markets

Alternative fuels
Biopharmaceuticals
Chemical & refining
Food & beverage
Marine & shipbuilding
Medical & dental
Microelectronics
Nuclear Power
Offshore oil exploration
Oil & gas
Pharmaceuticals
Power generation
Pulp & paper
Steel
Water/wastewater

Key Products

Analytical Instruments
Analytical sample conditioning products & systems
Chemical injection fittings & valves
Fluoropolymer chemical delivery fittings, valves & pumps
High purity gas delivery fittings, valves, regulators & digital flow controllers
Industrial mass flow meters/controllers
Permanent no-weld tube fittings
Precision industrial regulators & flow controllers
Process control double block & bleeds
Process control fittings, valves, regulators & manifold valves



Sealing & Shielding

Key Markets

Aerospace
Chemical processing
Consumer
Fluid power
General industrial
Information technology
Life sciences
Microelectronics
Military
Oil & gas
Power generation
Renewable energy
Telecommunications
Transportation

Key Products

Dynamic seals
Elastomeric o-rings
Electro-medical instrument design & assembly
EMI shielding
Extruded & precision-cut, fabricated elastomeric seals
High temperature metal seals
Homogeneous & inserted elastomeric shapes
Medical device fabrication & assembly
Metal & plastic retained composite seals
Shielded optical windows
Silicone tubing & extrusions
Thermal management
Vibration dampening

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